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REMARKS

Applicant wishes to thank Examiner for granting the interview held on February 2, 2004, at which time the above further amendments to certain claims were discussed. The amendments are believed free of new matter objections.

Claim 1 now recites:

> c) a catalyst bed located within said outer region, and through which reformate gases flow, said bed extending only helically, there being flow guide surfaces extending helically adjacent the catalyst to direct all gases to flow only helically through the helical bed,

See also claim 15, in this regard.

Sederquist does not suggest the totality of c) in the totality of claim 1, since his catalyst bed does not extend helically, since most of the bed lies away from any helical path Examiner thinks exists. Note the width of the bed 30. Gases flow almost straight up through bed 30, and not helically as shown by the flow means.

Collins does not disclose a helical catalyst bed, or helical gaseous flow, as recognized by Examiner at page 5, last three lines of the Action, and it would not be obvious to Sederquist or Collins to provide a helical bed as claimed, since they want gases to flow straight through the bed (see flow arrows in Sederquist). Thus, the skill of the art is to flow gas straight through a bed, not helically. Buswell passes gas longitudinally (i.e. not helically) through his apparatus (see column 7, lines 19 and 20, and 29-31). Note the straight through path, in longitudinal alignment with ports 305 and 307. Thus, all references teach straight through gaseous flow.

Further, see claim 7 as now extensively amended to incorporate detailed subject matter of claims 1, 7, 9 and 10. No reference suggests how to or whether to combine Collins, Kydd, Sederquist, and Buswell, to arrive at detailed totality of claim 7.

Accordingly, all claims are believed and urged to be allowable.

Remarks of the inventor are as follows:

There is a fundamental difference between the present reactor design and those cited in the patent literature. Applicants' reactor design is the first to teach the use of all gases flowing in a helical path

through the catalyst bed. Rather, the cited patent art only teaches the use of a coil (containing a coolant) that is imbedded within a cylindrical catalyst bed.

The Examiner states that Sederquist et al discloses ''....there being flow guide surfaces (as defined by plate coil 52 of generator 38, which surrounds cooling coils 41/42) extending helically and adjacent the catalyst bed, to direct cooling fluid around the periphery of the actively cooled catalytic bed zone 34 and to *inherently* direct gases to flow helically through the bed, as evidenced by the catalyst particles 30 of zone 34 being helically embedded in the spaces between the helical flow guide surfaces 52.'' However, the Examiner's interpretation of the prior art is believed misguided, as Sederquist does not describe any physical method to direct the gases in a helical manner through the catalyst bed. In fact, if one inspects Fig. 1 of the cited Sederquist invention, it clearly shows the vertical (not helical) flow path of the gases 32 from the lower end to the upper end of the catalyst bed. There is absolutely no suggestion of any helical flow path of the gases in the catalyst bed

anywhere in text or the drawings of the patent, and no way of conforming helical flow.

It is to be understood that an imbedded helical cooling coil does not inherently induce the *helical flow* of gases within the catalyst bed outside the coil. The present invention typically looks like a screw with an outer sheath attached to the threads of the screw to confine the flow of gases around the helical path of the screw. The catalyst is contained within the empty spaces of the screw threads (i.e. the space between the screw body and the outer sheath). In other words, the catalyst is physically disposed in a helical flow path. Again, none of the other prior patent art teaches this concept.

The Examiner indicates that the use of helical extended surfaces to improve heat transfer is well know in the art. However, the helical flow surfaces of the present invention are not simply extended heat transfer surfaces, but are a fundamental part of the physical design to induce helical flow through a confined catalyst bed. The benefits of this arrangement have been previously described.

To summarize, none of the prior art cited teaches the flow of gases in a helical manner through and

around an outer annulus using a confining helical coil structure that is in contact with the heat transfer surface of an inner wall.

Respectfully submitted,

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